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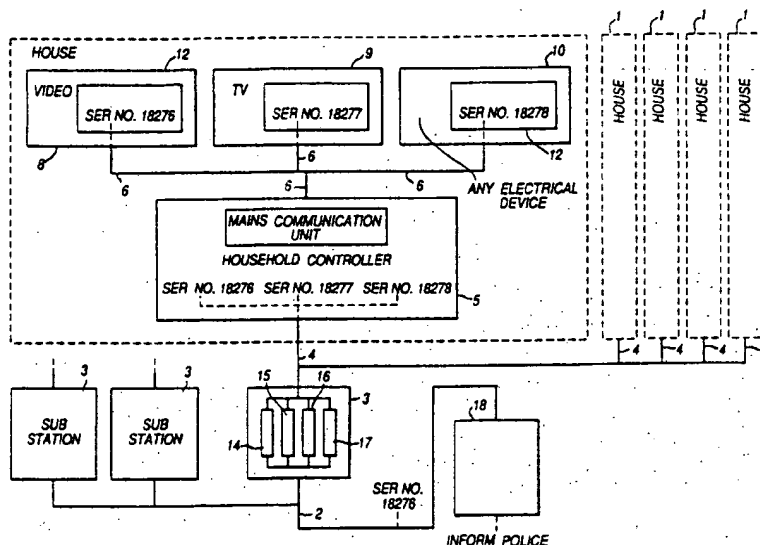
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(54) **Security system**

(57) A security system for locating items of electrical equipment, which is comprised of security identification units and a controller unit, the security identification units being located within the items of electrical equipment. To provide power to the items of electrical equipment they must be connected to a power distribution network, which may be a national electrical grid or

'mains' supply. In use the security identification units are arranged to communicate identification data with the controller unit via the electrical power distribution network, thereby providing an indication of a presence or an absence of at least one of the items of electrical equipment.



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## Description

The present invention relates to security systems. More particularly the present invention relates to security systems which operate to detect stolen items electrical equipment.

Electrical goods are a common target for thieves and burglars. This is because such electrical goods are comparatively expensive items but more especially it is because of a lack of clearly distinguishing features of such goods which allows them to be resold or passed on by the burglars to unsuspecting buyers. If however the location of such goods could be monitored and tracked, stolen electrical goods could be rapidly recovered providing an inherent deterrent to thieves and burglars from stealing the goods.

It is therefore an object of the present invention to provide a security system for locating stolen electrical goods.

According to the present invention there is provided a security system for locating items of electrical equipment, said security system comprising security identification units and a controller unit, said security identification units being located within said items of electrical equipment and arranged in use to communicate identification data with said controller unit via an electrical power distribution network to which said items of electrical equipment are connected, thereby providing an indication of a presence or an absence of at least one of the items of electrical equipment.

Advantageously the identification data may represent serial numbers which serve to identify the items of electrical equipment in which a security identification unit is embodied.

Advantageously the security system may further comprise addressing units connected to the electrical power distribution network at strategic points, which addressing units operate to generate address data communicated via said electrical power distribution circuit to said controller unit.

By providing security identification units embodied within items of electrical equipment for which security protection is required, and arranging for the security identification unit to communicate identification data with a central controller via an electrical power distribution circuit to which the electrical equipment is connected, the whereabouts of the item of electrical equipment may be determined from the identification number in combination with the address data representative of the point in the electrical power distribution circuit to which the item of electrical apparatus is connected.

The addressing units may be located within local sub-stations forming part of said electrical power distribution network.

The addressing units may be embodied within electricity meters associated with a domestic premises connected to said electric power distribution network.

The controller unit may operate to interrogate said identification units, in response to which interrogation, said identification units may transmit identification data representative of each of the identification units so interrogated.

The interrogation by the controller unit may comprise transmitting to the identification units via the electrical power distribution network identification data representative of items of electrical equipment known to have been stolen.

According to another aspect of the present invention there is provided a security system for locating items of electrical equipment, comprising security identification units embodied within the items of electrical equipment, and household controller units coupled to electricity circuits associated with premises where said items of electrical equipment may be operated, which household controller units have a data store and operate to store data therein appertaining to a list of identification data representative of serial numbers of items of electrical equipment for use at the premises, thereby providing in combination with said security identification units a register of items of electrical equipment to be used at a premises.

Advantageously the identification units may operate to communicate identification data with the household controllers, which household controllers may further operate to compare the identification data communicated thereto by the identification units with the list of identification data registered for use at the premises. This may serve to establish whether any electrical equipment connected to the electrical circuits do not correspond with those present in the data store.

The household controller may further operate in combination with the security identification units to affect a disconnection of the electrical apparatus from the electrical power distribution circuit when said electrical apparatus is not recognised by said household controller.

According to a yet further aspect of the present invention there is provided a method of monitoring an item of electrical equipment, comprising the steps of

arranging for an identification unit to be embodied within said item of electrical equipment,  
connecting said item of electrical equipment to an electrical power distribution network from which said item of electrical equipment is arranged to draw electrical power,  
periodically transmitting identification data from said identification unit via said electrical power distribution network to a controller unit, which identification data is representative of a serial number associated with said item of electrical equipment, and  
generating an alarm signal when said controller unit does not receive said identification data for a predetermined period, indicative of said item of electrical

equipment having been stolen.

One embodiment of the present invention will now be described with reference to Figure 1 which shows a schematic block diagram representation of a security system for identifying the location of items of electrical apparatus connected to a power distribution circuit. As will be appreciated various embodiments of the invention may be arranged to give effect to the general principles of the present invention of which Figure 1 is representative of a possible example only. In Figure 1 houses 1 are shown to be connected to an electrical power distribution circuit 2 via a local sub-station 3. Electricity is conveyed from the local sub-station 3 to the houses 1 via conductors 4. Electricity is received in the houses 1 by main electricity unit 5. The mains electricity unit 5 serve to meter electrical power consumed by the electrical power consumers represented by the houses 1. Domestic electricity circuits associated with the houses 1 are represented by the conductors 6 to which are connected three items of electrical equipment 8, 9, 10, respectively. Within each of the items of electrical apparatus 8, 9, 10, is a security identification unit 12. Embodied within the local sub-station 3, are household controller units 14, 15, 16, 17, each of which is respectively associated with one of the houses 1. As will be appreciated the household controller units 14, 15, 16, 17, could also be embodied within the electricity meters 5. Connected to the electrical power distribution network 2 is a controller unit 18.

In operation the security identification units 12 periodically transmit via the electricity distribution network 2, identification numbers appertaining to a serial number associated with the electricity equipment 8, 9, 10, to the controller unit 18. This provides a means for registering the electrical equipment 8, 9, 10, for which security protection is desired with the controller unit 18 which provides a way of monitoring the presence of the electrical apparatus 8, 9, 10.

In order to provide the system with a means for identifying the location of electrical equipment connected to the electrical power distribution network, the household controller units 14, 15, 16, 17, are provided with a means of generating address data associated with each house 1, to which they are connected by conductors 4. This address data may be representative of the postcode of the premises 1, where the electrical equipment is located. Alternatively other addressing units may serve to perform this function, and may be located elsewhere in the electrical power distribution network. In this case the address data would represent a part of the electrical distribution network associated with an addressing unit.

When the identification number associated with the electrical equipment connected to the domestic electricity supply 6, and to the electrical power distribution network 2, is transmitted from the security identification unit 12, to the central controller 18, the household controller

units 14, 15, 16, 17, (or addressing units) operate to append address data to the identification data. This provides a means whereby electrical equipment may not only be monitored as to its presence at a predetermined location, but also to provide a means whereby the electrical equipment may be located wherever it is connected to the electricity distribution network.

In a yet further embodiment of the present invention, the household controller units 14, 15, 16, 17, may be provided with a data store wherein there is stored a list of serial numbers appertaining to electrical equipment which is authorised for use at the premises associated with the houses 1. Furthermore the household controller units 14, 15, 16, 17, may be provided with a means for transmitting signalling information to the central controller unit 18, when any item of electrical equipment not authorised to be connected to the domestic circuit 6, associated with the houses 1, is connected to the electricity supply at that address. The household controller units 14, 15, 16, 17, may be furthermore provided with a means for preventing operation of any electrical equipment not associated or recognised with either household controller units 14, 15, 16, 17, from the list of authorised serial numbers contained in the associated data store.

The central controller unit 18, may be located at the premises of a security company which may monitor incoming security or identification numbers and compare these numbers with known lists of registered items reported as being stolen. Thereafter such items may be located in accordance with the household unit indicated from the address data received with the identification data. Furthermore, when items of electrical equipment are known to have been stolen, the security company may arrange for the controller unit to interrogate the security identification units, by transmitting to the identification units via the electrical power distribution network identification data representative of items of electrical equipment known to have been stolen. In response to this interrogation, the identification units may transmit identification data representative of each of the identification units so interrogated. The location of the items of electrical equipment may thereafter be determined from the address data received with the identification data.

In an alternative embodiment of the invention the location of items of electrical equipment, may be determined by utilising information appertaining to the phase or the voltage of the electrical power supplied by the electrical power distribution network. Since the phase and the voltage of electrical power varies between different parts of the electrical power distribution network in a known or predictable way, this variation can be used to locate items of electrical equipment. By arranging for the security identification units to measure the phase or peak voltage of the alternating current drawn from the electrical power supply by the items of electrical equipment, and communicating this to the controller unit with

the identification data, the controller unit may determine the location of the items of electrical equipment from the measured phase or peak voltage and information appertaining to the phase or voltage of the alternating current electrical power supplied by the electrical power distribution network at various parts of the electrical power distribution network. Alternatively, both phase and voltage can be used to facilitate location of the electrical equipment.

As will be appreciated by those skilled in the art, various modifications of the embodiments hereinbefore described may be provided without departing from the scope of the present invention. In particular, other arrangements for providing information appertaining to the location of the item of electrical equipment may be provided.

### Claims

1. A security system for locating items of electrical equipment, said security system comprising security identification units and a controller unit, said security identification units being located within said items of electrical equipment and arranged in use to communicate identification data with said controller unit via an electrical power distribution network to which said items electrical equipment are connected, thereby providing an indication of a presence or an absence of at least one of the items of electrical equipment.
2. A security system as claimed in Claim 1, wherein the identification data is representative of at least one serial number, each of which at least one serial number serves to identify an item of electrical equipment in which a corresponding security identification unit is embodied.
3. A security system as claimed in Claims 1 or 2, further comprising addressing units coupled to the electrical power distribution network at strategic points, which addressing units operate to generate address data communicated via said electrical power distribution circuit to said controller unit, with said identification data.
4. A security system as claimed in Claim 3, wherein the address data is combined with the identification data when said identification data communicated via said electrical power distribution network passes through parts of said electrical power distribution network associated with the strategic points at which addressing units are coupled, which address data serves to indicate the location of said items of electrical equipment.
5. A security system as claimed in Claims 3 or 4, wherein the addressing units are located within local sub-stations which form part of said electrical power distribution network.
6. A security system as claimed in Claims 3 or 4, wherein the addressing units are embodied within electricity meters associated with a consumer's premises connected to said electric power distribution network.
7. A security system as claimed in any preceding Claim, wherein the controller unit operates to interrogate said identification units, in response to which interrogation, said identification units transmit identification data representative of each of the identification units so interrogated.
8. A security system as claimed in Claim 7, wherein the interrogation by the controller unit comprises transmitting to the identification units via the electrical power distribution network identification data representative of items of electrical equipment known to have been stolen.
9. A security system as claimed in Claim 1, wherein said security identification units operate to measure a phase of the alternating current drawn from the electrical power supply by said items of electrical equipment, and communicates the phase to the controller unit with said identification data, which controller unit operates to determine the location of said items of electrical equipment from the measured phase and predetermined phase data representative of the phase of the alternating current electrical power supplied by said electrical power distribution network at a plurality of parts of said power distribution network.
10. A security system as claimed in Claim 1, wherein said security identification units operate to measure a peak voltage level of the alternating current drawn from the electrical power supply by said items of electrical equipment, and communicates the peak voltage level to the controller unit with said identification data, which controller unit operates to determine the location of said items of electrical equipment from the measured peak voltage and predetermined voltage data representative of peak voltages of the alternating current electrical power supplied by said electrical power distribution network at a plurality of parts of said power distribution network.
11. A security system for locating items of electrical equipment, comprising security identification units embodied within the items of electrical equipment, and household controller units coupled to electricity circuits associated with premises where said items of electrical equipment may be operated, which

household controller units have a data store and operate to store data therein appertaining to a list of identification data representative of serial numbers of items of electrical equipment for use at the premises, thereby providing in combination with said security identification units a register of items of electrical equipment to be used at a premises.

12. A security system as claimed in Claim 11, wherein the identification units operate to communicate identification data with the household controllers, which household controllers operate to compare the identification data communicated thereto by the identification units with the list of identification data registered for use at the premises, thereby establishing whether any electrical equipment connected to the electrical circuits do not correspond with those present in the data store.

13. A security system as claimed in Claim 11 or 12, wherein the household controllers further operate in combination with the security identification units to effect a disconnection of an item of electrical equipment from the electrical circuit connected thereto, when the identification data corresponding to said item of electrical equipment is not correspondingly indicated as present in said data store of said household controller.

14. A security system as claimed in Claim 11 or 12, wherein the household controllers operate to communicate identification data with a controller unit via an electrical power distribution network to which said electrical circuits are connected, which identification data correspond to items of electrical equipment not correspondingly indicated as present in said data store of said household controller.

15. A method of monitoring an item of electrical equipment, comprising the steps of

arranging for an identification unit to be embodied within said item of electrical equipment, connecting said item of electrical equipment to an electrical power distribution network from which said item of electrical equipment is arranged to draw electrical power, periodically transmitting identification data from said identification unit via said electrical power distribution network to a controller unit, which identification data is representative of a serial number associated with said item of electrical equipment, and generating an alarm signal when said controller unit does not receive said identification data for a predetermined period, indicative of said item of electrical equipment having been stolen.

16. A method of monitoring an item of electrical equipment as claimed in Claim 15, further comprising the steps of,

measuring the phase of alternating current electrical power from which said items of electrical equipment draw electrical power, and determining the location of said items of electrical equipment from said measured phase in combination with predetermined phase of the alternating current electrical power at a plurality of parts of said power distribution network.

17. A method of monitoring an item of electrical equipment as claimed in Claim 15, further comprising the steps of,

measuring a peak voltage of the alternating current electrical power from which said items of electrical equipment draw electrical power, and determining the location of said items of electrical equipment from said measured peak voltage in combination with predetermined peak voltages of the alternating current electrical power at a plurality of parts of said power distribution network.

18. A method of locating at least one item of electrical equipment, comprising the steps of,

arranging for identification units to be embodied within said items of electrical equipment, arranging for addressing units to be coupled to said power distribution network at strategic points, transmitting indication data from said identification units via an electrical power distribution network to which said item of electrical equipment is likely to be connected, said indication data being representative of a serial number appertaining to said item of electrical equipment, appending to said indication data address data representative of parts of said electrical power distribution network associated with said strategic points, via which said indication data has passed, thereby providing an indication of the location of said items of electrical equipment connected to said electrical power distribution network.

